

In re: John Weldon Gammon *et al.*
Serial No.: 10/622,398
Filed: July 18, 2003
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In the Claims:

The listing of Claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A mobile terminal comprising:
a housing;
an electronic circuit positioned in the housing;
a first speaker positioned adjacent a first side of the electronic circuit;
a second speaker positioned adjacent the first speaker on the first side of the electronic circuit; [[and]]

a grommet positioned in the housing that is configured to receive the first speaker and the second speaker, wherein the first speaker and the second speaker are positioned in the grommet, wherein the grommet is configured to provide a seal between a front face of the first speaker and a back face of the first speaker and between a front face of the second speaker and a back face of the second speaker and wherein the housing comprises a front face including a keypad and an earpiece and wherein the first speaker and the second speaker are positioned between the electronic circuit and the front face and wherein the electronic circuit comprises a printed circuit board, the mobile terminal further comprising a first passageway acoustically coupling the front face of the first speaker to the earpiece; and

a second passageway acoustically coupling the front face of the second speaker to an opening in a face of the housing remote from the earpiece, wherein the first passageway includes a first high frequency forward tuning volume adjacent the front face of the first speaker and wherein the second passageway includes a second high frequency forward tuning volume adjacent the front face of the second speaker, the mobile terminal further comprising:

a first low frequency back tuning volume adjacent the back face of the first speaker;
and

a second low frequency back tuning volume adjacent the back face of the second speaker.

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2. (Original) The mobile terminal of Claim 1, wherein the first speaker comprises a receiver speaker and the second speaker comprises a micro-speaker.

3. (Original) The mobile terminal of Claim 2, wherein the receiver speaker has a DC resistance at least about two times a DC resistance of the micro-speaker.

4. (Original) The mobile terminal of Claim 3, wherein the DC resistance of the receiver speaker is about 32 ohms and the DC resistance of the micro-speaker is about 8 ohms.

5- 7. (Cancelled).

8. (Currently Amended) The mobile terminal of Claim [[7]] 1 further comprising a seal between a first face of the grommet and the front face of the housing and a seal between a second face of the grommet and the first side of the printed circuit board.

9. (Cancelled).

10. (Currently Amended) The mobile terminal of Claim [[9]] 1 wherein the grommet defines the first and second passageways.

11. (Currently Amended) The mobile terminal of Claim [[9]] 1 wherein the opening remote from the earpiece is positioned on a side face of the housing.

12. (Cancelled).

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13. (Currently Amended) The mobile terminal of Claim [[12]] 1, wherein the grommet further comprises an opening extending through the grommet that acoustically couples the first forward tuning volume and the first low frequency back tuning volume and wherein the first passageway acoustically couples the front face of the first speaker and the back face of the first speaker to the earpiece.

14. (Currently Amended) The mobile terminal of Claim [[12]] 1, wherein the grommet further includes a seal member between a face of the grommet adjacent the front face of the first speaker and the front face of the housing and wherein the seal member includes a slit and wherein a bottom of the front face of the housing includes a groove adjacent the front face of the first speaker and wherein the slit is configured to align with the groove to define a third passageway that acoustically couples the front face of the first speaker and the first forward tuning volume.

15. (Currently Amended) The mobile terminal of Claim [[12]] 1 further comprising:

a mounting member between the front face of the housing and a back face of the housing, wherein the printed circuit board is positioned between the front face of the housing and the mounting member.

16. (Original) The mobile terminal of Claim 15 further comprising at least one opening extending through the printed circuit board adjacent the back face of the first speaker that acoustically couples the back face of the first speaker to a region of the first back tuning volume defined by the printed circuit board and the mounting member.

17. (Original) The mobile terminal of Claim 15, further comprising a planar antenna positioned in the housing between the mounting member and the back face of the housing.

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18. (Original) The mobile terminal of Claim 17 further comprising at least one opening extending through the printed circuit board adjacent the back face of the second speaker that acoustically couples the back face of the second speaker to a first region of the second back tuning volume defined by the printed circuit board and the mounting member.

19. (Original) The mobile terminal of Claim 18 further comprising a second region of the second back tuning volume defined by the mounting member and the planar antenna and at least one opening extending through the mounting member between the first region and the second region of the second back tuning volume.

20. (Original) The mobile terminal of Claim 19 further comprising at least one opening extending through the printed circuit board adjacent the back face of the first speaker that acoustically couples the back face of the first speaker to a region of the first back tuning volume defined by the printed circuit board and the mounting member.

21. (Original) The mobile terminal of Claim 19 wherein the grommet is configured to provide seals for the first passageway and the second passageway and the first back tuning volume and the second back tuning volume to suppress acoustic echo in the housing by reducing leakage from the second passageway and the first and second back tuning volumes past the earpiece.

22. (Original) The mobile terminal of Claim 19 further comprising a seal between a second side of the printed circuit board and a first face of the mounting member that substantially closes the first back tuning volume and seals between a second side of the printed circuit board and a first face of the mounting member and between a first face of the planar antenna and a second face of the mounting member that substantially closes the second back tuning volume.

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23. (Original) The mobile terminal of Claim 22 wherein the seal between the second side of the printed circuit board and the first face of the mounting member comprises a plastic to plastic seal and the seals between a second side of the printed circuit board and a first face of the mounting member and between a first face of the planar antenna and a second face of the mounting member comprise a plastic to plastic seal.

24. (Original) The mobile terminal of Claim 23 wherein at least one of the seals between the printed circuit board and the planar antenna and the mounting member further comprises an adhesive layer.

25. (Original) The mobile terminal of Claim 17 wherein the printed circuit board defines a ground plane and wherein the planar antenna is substantially parallel to and electrically coupled to the printed circuit board and positioned at a selected distance from the ground plane to provide a desired frequency response of the planar antenna.

26. (Currently Amended) The mobile terminal of Claim [[9]] 1 further comprising:
at least one spring connector that electrically couples the first speaker to the first side of the electronic circuit; and
at least one spring connector that electrically couples the second speaker to the first side of the electronic circuit.

27. (Currently Amended) ~~The mobile terminal of Claim 9~~ A mobile terminal comprising:
a housing;
an electronic circuit positioned in the housing;
a first speaker positioned adjacent a first side of the electronic circuit;

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a second speaker positioned adjacent the first speaker on the first side of the electronic circuit;

a grommet positioned in the housing that is configured to receive the first speaker and the second speaker, wherein the first speaker and the second speaker are positioned in the grommet, wherein the grommet is configured to provide a seal between a front face of the first speaker and a back face of the first speaker and between a front face of the second speaker and a back face of the second speaker and wherein the housing comprises a front face including a keypad and an earpiece and wherein the first speaker and the second speaker are positioned between the electronic circuit and the front face and wherein the electronic circuit comprises a printed circuit board, the mobile terminal further comprising a first passageway acoustically coupling the front face of the first speaker to the earpiece; and

a second passageway acoustically coupling the front face of the second speaker to an opening in a face of the housing remote from the earpiece, wherein the opening remote from the earpiece has an area of less than about 10 square millimeters (mm²).

28. (Currently Amended) ~~The mobile terminal of Claim 9 further comprising~~ A mobile terminal comprising:

a housing;

an electronic circuit positioned in the housing;

a first speaker positioned adjacent a first side of the electronic circuit;

a second speaker positioned adjacent the first speaker on the first side of the electronic circuit;

a grommet positioned in the housing that is configured to receive the first speaker and the second speaker, wherein the first speaker and the second speaker are positioned in the grommet, wherein the grommet is configured to provide a seal between a front face of the first speaker and a back face of the first speaker and between a front face of the second speaker and a back face of the second speaker and wherein the housing comprises a front face including a keypad and an earpiece and wherein the first speaker and the second speaker are

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positioned between the electronic circuit and the front face and wherein the electronic circuit comprises a printed circuit board, the mobile terminal further comprising a first passageway acoustically coupling the front face of the first speaker to the earpiece;

a second passageway acoustically coupling the front face of the second speaker to an opening in a face of the housing remote from the earpiece; and

a filter in the opening remote from the earpiece.

29. (Original) The mobile terminal of Claim 28 wherein the filter comprises a foam insert.

30. (Cancelled).

31. (Currently Amended) ~~The mobile terminal of Claim 30~~ A mobile terminal comprising:

a housing;

an electronic circuit positioned in the housing;

a first speaker positioned adjacent a first side of the electronic circuit;

a second speaker positioned adjacent the first speaker on the first side of the electronic circuit;

a grommet positioned in the housing that is configured to receive the first speaker and the second speaker, wherein the first speaker and the second speaker are positioned in the grommet and wherein the grommet comprises:

a first member configured to receive the first speaker and to provide a seal between a front face of the first speaker and a back face of the first speaker; and

a second member configured to receive the second speaker and to provide a seal between a front face of the second speaker and a back face of the second speaker, wherein the first and second members comprise a unitary member.

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32. (Original) The mobile terminal of Claim 1 wherein the first speaker and the second speaker have a diameter of from about 10 millimeters (mm) to about 20 mm.

33. (Original) The mobile terminal of Claim 1 further comprising;
a receiver that receives encoded audio signals from a wireless communications network; and
a controller that decodes the received audio signals and selectively provides the decoded audio signals to the first and/or the second speaker.

34. (Original) A speaker assembly comprising:
a grommet defining adjacent first and second receiving chambers;
a first speaker positioned in the first receiving chamber;
a second speaker positioned in the second receiving chamber; and
wherein the grommet is configured to provide a seal between a front face of the first speaker and a back face of the first speaker and between a front face of the second speaker and a back face of the second speaker.

35. (Original) The speaker assembly of Claim 34 wherein the grommet is further configured to define a first acoustic passageway extending from the first chamber to an outer face of the grommet and a second acoustic passageway extending from the second chamber to an outer face of the grommet at a location remote from the first acoustic passageway.

36. (Original) The speaker assembly of Claim 35 wherein the grommet has a first face configured to provide a seal between the grommet and a substantially planar member and a second face, opposite the first face, configured to provide a seal between the grommet and a substantially planar member.

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37. (Original) The speaker assembly of Claim 34 wherein the grommet comprises a unitary elastomeric member.